



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/628,021	07/25/2003	Harry J. Levinson	H1530	3376
45305	7590	08/24/2005	EXAMINER	
RENNER, OTTO, BOISSELLE & SKLAR, LLP (AMDS) 1621 EUCLID AVE - 19TH FLOOR CLEVELAND, OH 44115-2191			MERLINO, AMANDA H	
			ART UNIT	PAPER NUMBER

2877

DATE MAILED: 08/24/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/628,021

Applicant(s)

LEVINSON, HARRY J.

Examiner

Amanda H. Merlino

Art Unit

2877

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 25 July 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 3/11/05 & 7/20/05.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-5 and 11-13 rejected under 35 U.S.C. 102(b) as being anticipated by Takahashi et al. (EP 0 605 103 A1).

Takahashi et al teaches of a method for monitoring an immersion lithography system comprising the steps of immersing a wafer in liquid (col 5: lines 44-45), detecting an index of refraction of the immersion medium (col 10, lines 53-55) in a volume of the immersion medium through which an exposure pattern is configured to traverse and determining if the index of refraction is acceptable for exposing the wafer with the exposure pattern (col 11, lines 46-48), exposure operation is done after the homogeneity, i.e. the variation of the index of refraction of the immersion liquid, has been checked using refractive index measure device 803. Implicitly, this would imply that the exposure is only performed if the homogeneity, and therefore the refractive index, of the liquid is within an acceptable range. Furthermore, the refractive index is measured during different times at different locations on the immersion fluid (col 11; lines 54-57)

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 6-10 rejected under 35 U.S.C. 103(a) as being unpatentable over Takahashi et al. (EP 0 605 103 A1) in view of Oono et al (5,151,752). Takahashi et al teaches of a method for monitoring an immersion lithography system comprising the steps of immersing a wafer in liquid (col 5: lines 44-45), detecting an index of refraction of the immersion medium (col 10, lines 53-55) in a volume of the immersion medium through which an exposure pattern is configured to traverse and determining if the index of refraction is acceptable for exposing the wafer with the exposure pattern (col 11, lines 46-48), exposure operation is done after the homogeneity, i.e. the variation of the index of refraction of the immersion liquid, has been checked using refractive index measure device 803. Implicitly, this would imply that the exposure is only performed if the homogeneity, and therefore the refractive index, of the liquid is within an acceptable range. Furthermore, the refractive index is measured during different times at different locations on the immersion fluid (col 11; lines 54-57).

Takahashi lacks the teaching of the index of refraction being measured with an interferometer assembly.

Oono et al (5,151,752) teaches of measuring the index of refraction of a liquid using an interferometer.

At the time of the invention, it would have been obvious to one of ordinary skill in the art to replace the refractometer as taught by Takashi and replace it the interferometric refractometer taught by Oono et al. since it would have been obvious to one of ordinary skill in the art to use any of the many well known refractometer (non interferometric or interferometric) since applicant has not disclosed that the use of the interferometric refractometer solves any stated problem, has any specific benefit, or is for any particular purpose and it appears that the invention would perform equally well as a functional equivalent with the refractometer taught by Takahasi.

Claims 14-17 rejected under 35 U.S.C. 103(a) as being unpatentable over Takahashi et al. (EP 0 605 103 A1) in view of Oono et al (5,151,752) as applied to claim 5-10 above, and further in view of Uesugi et al (5,870,189).

Takahasi et al and Oono et al lack the teaching a of detection system for detecting scattered light to monitor for foreign bodies such as particles in the immersion fluid.

Uesugi et al teach of a light particle scattering detector for detecting particles in a fluid.

At the time of the invention, it would have been obvious to one of ordinary skill in the art to implement the light particle scattering detector taught by Uesugi et al to detect particles since it is well known in the art of immersion lithography that particles and or bubbles in the liquid causes scatted light which produces printing defects. By detecting

the particles, one can achieve a more accurate measurement by either eliminating the particles and/or compensating for them during printing.

Claim 18-20 rejected under 35 U.S.C. 103(a) as being unpatentable over Takahashi et al. (EP 0 605 103 A1) in view of Oono et al (5,151,752).

Takahashi et al teaches of an apparatus for monitoring an immersion lithography system in accordance with figure 1 comprising a chamber (9) for receiving a wafer (2) to be exposed and immersing the wafer in an immersion medium (23) (col 5: lines 44-45), an imaging subsystem (3) for directing an exposure pattern towards the wafer and through the immersion medium (23), an immersion medium monitoring subsystem for measuring an index of refraction of the immersion medium (col 10, lines 53-55) in a volume of the immersion medium through which an exposure pattern is configured to traverse and determining if the index of refraction is acceptable for exposing the wafer with the exposure pattern (col 11, lines 46-48), exposure operation is done after the homogeneity, i.e. the variation of the index of refraction of the immersion liquid, has been checked using refractive index measure device 803. Implicitly, this would imply that the exposure is only performed if the homogeneity, and therefore the refractive index, of the liquid is within an acceptable range . Furthermore, the refractive index is measured during different times at different locations on the immersion fluid (col 11; lines 54-57)

Takahashi lacks the teaching of the index of refraction being measured with an interferometer assembly, the interferometer directing a test portion of a laser beam through the immersion medium and for directing a control portion of the laser beam

Art Unit: 2877

around the chamber, and a detector outputting a signal indicative of an index of refraction of the immersion medium.

Oono et al (5,151,752) teaches of measuring the index of refraction of a liquid using an interferometer with reference to figure 14, the interferometer directing a test portion of a laser beam through the immersion medium (8) and for directing a control portion of the laser beam around the chamber (6), and a detector (14) for detecting the interference of the test portion and the control portion, and a processor (16) for computing the refractive index of the immersion medium.

At the time of the invention, it would have been obvious to one of ordinary skill in the art to replace the refractometer as taught by Takashi and replace it with the interferometric refractometer taught by Oono et al since it would have been obvious to one of ordinary skill in the art to use any of the many well known refractometers (non interferometric or interferometric) since applicant has not disclosed that the use of the interferometric refractometer solves any stated problem, has any specific benefit, or is for any particular purpose and it appears that the invention would perform equally well as a functional equivalent with the refractometer taught by Takahasi.

### **Conclusion**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Amanda H Merlino whose telephone number is 571-272-2421. The examiner can normally be reached on Monday and Thursday.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory J Toatley, Jr. can be reached on 571-272-2800 ext 77. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Amanda H Merlino  
Patent Examiner  
Art Unit 2877  
August 18, 2005



**HWA (ANDREW) LEE**  
**PRIMARY EXAMINER**



Gregory J. Toatley, Jr.  
Supervisory Patent Examiner